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CORRECTIONS AND ADDITIONS TO PREVIOUS PAPERS.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

The lapse of time and further observation on some of the things treated of in papers previously published in the ENTOMOLOGIST, render it desirable to make some corrections and additions.

Trogoderma ornata, Vol. XV., 91, and XVI., 37.—The treatment of this pest there detailed so completely annihilated it that it has not been seen since.

Dermestes Frischii, Vol. XVI., 37.—Seems to be successfully naturalized, since it still occurs abundantly on Brigantine Beach, and last September was found at Atlantic City. Mr. Ulke has also taken it at Washington, D. C. (Ulke MS.).

D. murinus, l. c.—This species, if ever imported, is not known to have established itself. There is a form of *D. nubilus* Say, with black or partly black antennæ, and a minimum of fulvous mottling on the thorax; specimens of this kind were probably before Dr. Leconte when he described his *murinus*, Pr. Acad. Nat. Sci. VII., 108; and before Dr. Jayne when writing his "Revision of the Dermestidæ."

Blaps.—The Virginia species of *Blaps*, found very abundantly at Alexandria, is *similis* Latr., as stated by Professor Riley. Another species found in Maryland by Mr. O. Luggar, is *mucronata* Latr. The comparisons and determinations were made by Dr. Horn on his recent trip to Europe.

Ceratocampa regalis, Vol. XVI., 15, 47 and 132.—I have had several favourable opportunities to observe the mode of pupation of the gigantic larvæ of this regal moth. Where it can find ground soft enough to penetrate, it always pupates under the earth, and if at a proper depth the pupa remains there in a clay cell formed around it by its own motions till it discloses in May; but if the larva does not get deep enough the pupa works to the surface and probably does not survive. Should the larva, as is

frequently the case, find no ground soft enough to bore into, it pupates wherever it may be when the change can no longer be deferred, and this occurs mostly under some leaves. Some of these exposed pupæ when collected in April will produce moths, notwithstanding the low temperature to which they must have been subjected.

Pterostichus, Vol. XVI., 73.—I there enumerated sixteen species taken in this vicinity; four others have since been discovered, and three have been transferred from *Evarthrus*, making a total of twenty-three.

P. vinctus Lec.—This species is semi-mountainous, inhabiting under stones on the sides of steep hills where the soil is moist and friable. Though not gregarious, when found several individuals may be taken in the same vicinity. Near the city, it must soon become extinct.

P. unicolor Say.—Of this rare insect I have only taken one specimen, and Mr. W. Klages took another. It must be sought for in mountainous places.

P. lachrymosus Newm.—Occurs with *adoxus*, and in about equal numbers; without care, from their great resemblance, they may easily be confused. Their future must be the same.

P. coracinus Newm.—On the south side of the Ohio, on the rugged sides of the hills yet in a primitive state, this species occurs abundantly. Certain individuals may readily be confused, some with *stygius* and others with *relictus*, according to the greater or less development of certain characters at the base of the thorax. It is not likely to soon become extinct.

P. tartaricus Say, for form *strenuus* Lec.—Specimens were taken in the city, in June and July, at electric lights, but it did not occur to me elsewhere.

P. patruelis Dej.—This little species inhabits a small swamp, inaccessible, except for a short time during the dry season. It is found about the roots of bunches of grass. When this swamp shall have been drained, this species will probably be extinct here, since no other primitive swamp remains in this vicinity.

P. femoralis Kirby.—Three specimens of this small species were taken once, but the habitat was not observed, though probably it is the swamp mentioned above.

P. Hamiltoni is much more widely distributed than was at first known. It occurs at a distance from the city on the sides of many of the hills in

their primitive state, and I have seen specimens from Maryland, West Virginia and Eastern Ohio.

Atenius, Vol. XVI., 189.—The species mentioned as undescribed has since been described by Dr. Horn under the name *Wenzeli*.

Epitragus arundinis, *ib.*, 190, is found abundantly in August and September, feeding on the pollen of the beech grass growing on the sandy dunes, the underground stems of which probably sustain the larvæ.

Lixus concavus, Vol. XVII., 38.—It is quite possible the bottle of cyanide of potassium, in which this beetle was placed for several days, may have contained no free hydro-cyanic acid, as the cork was airtight; therefore this proof of the longevity of the beetle is invalid.

Ips fasciatus, *ib.*, 46.—Lately the melanotic forms have occurred here in midsummer about as frequently as the fasciated. The difference in color does not appear to be either seasonal or racial. If a locality exists where either form is alone found it is unknown to me. If *melanism* depends on cold, a latitude or altitude should be reached where there would be only dark forms, and *vice versa*. The color of such of the European forms of *Ips* as I have seen appears to be more constant than in ours. The markings on *I. 4-guttatus* Linn., which appears to be the same as our *fasciatus*, only with a perceptibly finer punctuation, are very uniform in the numerous specimens I have seen, consisting of a humeral spot, trilobate in form, and two roundish ones behind the middle of the elytra, either separate or united like dumb-bells, yellowish or reddish. The suggestion of Mr. T. D. A. Cockerell, of Colorado, that humidity may be a potent factor in determining the color in variable species, seems deserving of consideration.

Macrobasis unicolor, *ib.*, 48.—A nursery of young locusts (*Robinia pseud-acaciæ*), growing on a stony knoll surrounded by meadows, was almost defoliated last July by swarms of this beetle. This knoll had probably been used the previous season by the grasshoppers (*Locustidæ*) of the meadows as the grand depository for their eggs, which were undoubtedly the food of the larvæ of these beetles; and which, after disclosure, promptly, in their voracity, attacked the nearest *Leguminosa*. This species is usually classed in economic entomology as *noxious*, because it occasionally eats a few beans, etc.; but it is certainly entitled to rank among the first on the list of *beneficial*, as without its friendly aid it is greatly to be feared the grasshopper would quickly become so numerous as to seriously affect agriculture.

Piazorhinus pictus, *ib.*, 105.—This variable species is fairly abundant here, and is beaten from various bushes, especially oak. In Florida it seems common.

Cicindela, *ib.*, 201.—On Brigantine Beach, N. J., *C. lepida* is sometimes found with *C. hirticollis*. When at rest it is not readily seen on the white sand—its own colour—and rarely moves till in danger of being trampled on, seemingly aware of the protective colour of the sand. A collector has stated to me that where it occurs on dark ground it is exceedingly wary and difficult to capture. With the species of the main land mentioned, occur in abundance, *C. consentanea*, *purpurea* and *punctulata*.

Danais archippus, *ib.*, 204.—Very few individuals were seen on Brigantine in 1887 and 1888, and no larvæ of *Anth. polyphemus*, nor of *H. io* were found, though quite abundant other years.

Clæotus aphodioides, Vol. XIX., 64.—This species has been the subject of renewed observation, and the former statement of its mode of hibernation must be re-affirmed. Mr. O. Lugger (Proc. Ent. Soc., Washington, V. I., 84) sheds light on its early stages, stating that he has frequently bred these beetles from their eggs, and has found them in all stages, *in situ*, viz., under the bark of dead trees, where they found food in the decaying material: adding, that very likely the specimens found by myself did not enter the holes to hibernate, but rather had made them to leave the place of their birth. The statement of Mr. Lugger is very interesting as to the habits of the larvæ, and it is to be hoped he may make known in greater detail the form of the eggs, larvæ and pupæ, as it is, so far as I know, the only species of the *Scarab. Laparosticti* that is recorded as being lignivorous in the larval state. With decaying wood as the breeding place of the larva, any discrepancy of observation about hibernation may be readily reconciled. Mr. Lugger's timber, under the bark, was probably rotten, and there the larvæ fed, pupated, disclosed, and the beetles hibernated. My timber, under the bark, was sound, and the bark inseparable from the wood, and there was no rotten wood for the larvæ to feed on; but the base of the tree and the subterranean roots would supply this material amply. The beetles, however, could not hibernate there, and so crawled up the tree and into any available hole; this also accounts for the mud on the elytra of many.

Saperda Fayi, Vol. XX., 6.—I have further to state that some of the

larva do not return in the spring of the second year to feed on the dead wood at the entrance of their burrows, but bore on directly up or down the centre of the limb, attaining a distance of from sixteen to twenty-four inches before pupating, in which case the beetle escapes by a round hole.

S. concolor, Vol. XX., 8.—Some of the larvæ of this species, like in *S. Fayi*, bore in the centre of the limb some distance, the beetle escaping by a round hole, which, I think, is cut by itself, as one from which a beetle was crawling appeared to have been newly made.

Dicerca prolongata, Vol. XX., 65.—The statement that this species breeds in conifers, while probably correct, requires more confirmation. It has, however, been ascertained that it breeds in some species of the *Salicaceæ*. Mr. Blanchard records its occurrence in Massachusetts, in June, on the trunks of young poplars and on poplar logs (*Populus tremuloides*). Mr. F. Bowditch took it on the same tree in the Rocky Mountains, and also on a species of willow (*Salix*); while in the mountains of Colorado, Mr. T. D. A. Cockerell took the beetle and probably its larvæ from this same poplar, when splitting it for firewood (Ent. Month. Mag., XXIV., 232).

Myrmophilous Coleoptera, Vol. XX., 161.—The following species must be added to the list:—

Biotus formicarius (Casey, Bull. Cal. Acad. Sci., II., 8).—Occurred at Los Angeles, California. "This interesting species lives in the nests of a small, pale brown ant."—Casey. *Biotus* is a new genus in CTENISTIDES. A figure of the insect accompanies the description.

Ptenidium evanescens Marsh.—This species, according to Matthews, is common in America, Europe, the Canary Islands and Madeira. F. W. Maeklin in his COLEOPT. MYRMECOPHILA FENNICA (No. 102), states that it is often taken, both mature and immature, in the nests of *Formica rufa*, as well as in other situations.

Limulodes paradoxus Matth.—This curious insect is described and figured in Ann. Lyc. Nat. Hist., N. Y., VIII., 409. It was first taken by Dr. Brendell in Florida, and subsequently by Mr. Ulke in New York and the District of Columbia, frequently in the nests of a yellow ant, which Dr. Leconte thought identical with the species with which *Ceophilus monilis* lives. My specimens are from Massachusetts.—Blanchard. Probably not rare. *Trichopterygia* (Matthews), 157.

Trichopteryx fascicularis Hbst.—Inhabits Europe and North Ameri-

ca, occurring sometimes with ants, but usually in the rejectamenta of stables, and seldom or never in rotten leaves, *l. c.*, 134. This species is a doubtful myrmophile.

Emphylyus Americanus Lec. (Bul. U. S. Geol. Surv, Vol. V., No. 3, 513).—Mr. Schwarz took the type of the species in an ant's nest at Veta Pass, Col., at the altitude of 11,500 feet.

Soronia (Amphotis) Ulkei Lec.—Mr. Ulke says of this species :—"I have found it every year, early in spring, in the nests of a small black ant (*Cremastogaster lineolata* Say), and this year I collected them in numbers among *Formica rufa*. The only species in Europe—*Amphotis marginata* Fab., is said to be found on flowers. Erichson found them, however, abundantly in the nests of *Formica fuliginosa*."—Entoml. Amer., III., 78.

Hypocoprus formicetorum Mots. (Bull. Mose., 1840).—This species, described from the Kirghis Steppes in Asia, was taken by Mr. Schwarz at Fort Garland, Colorado, in an ant's nest.—*l. cit.*, 503; Class. of the Coleop. of N. Amer., 140.

Myrmexchixenis latridioides Crotch. Occurs from Washington southwards, having been introduced with green-house plants.—Class., 140, Trans. Am. Ent. Soc., IV., 363. The habits of this species have not been recorded; but, as the European species live in ants' nests and about green-houses, it is introduced here to direct attention to it as a probable myrmophile.

Euparia castanea Serv. Occurs in Florida, Alabama and Louisiana, in the nests of a small ant (Horn).—Tr., XIV., 87. To be commonly met with in the Southern States in the nests of *Solenopsis Xylini* McC., the stinging ant of the cotton fields.—Amer. Nat., XVI., 784.

Euphoria hirtipes Horn.—This species is stated to have been found in Nebraska by Mr. Lawrence Bruner in the hills of the common red ant. It occurred quite commonly, and the larvæ were found as well as the beetles.—Amer. Nat., XVI., 748. The discovery of the larvæ of this beetle is a matter of so great interest, that the absence of all further account of them is disappointing. Maeklin states that the larvæ of *Cetonia aurata*, a near ally, are so abundant in the nests of *Formica rufa* on sandy shores, that fishermen use them commonly to bait their hooks.

Cremastochilus Knochii Lec.—This species was taken in the spring in ants' nests in Colorado by T. D. A. Cockerell, Custer County (in letter).

Hymenorus rufipes Lec.—The larvæ of this beetle were found abundantly in the nests of *Formica fusca* by Messrs. Pergande and Schwarz near Washington, D. C., and the beetles bred therefrom.—Am. Nat., XVI., 748, and XVII., 1176.

H. obscurus Say.—The larvæ of this beetle were likewise found at the same place in the nests of a large yellow ant, and, from the great care bestowed on them by the ants, it was inferred they were not there by accident.—*Ib.*, XVI., 748.

Mr. F. W. Maeklin published in 1846 his COLEOPTERA MYRMECOPHILA FENNICA, enumerating 136 species. He included such as were known to live with ants habitually; such as were found with them occasionally, but usually elsewhere, and even such as occurred in the vicinity of their nests, if of unknown habits. But the scope of the present catalogue is more limited, as stated in the introduction, and would exclude a large number of those on his list, and among them probably all of the following European-American species:—

Bembidium 4-maculatum Linn.—Dr. Sahlberg took at Ylæne a single individual with *F. rufa*. This species requires no further notice.

Tachyporus brunneus Fab.—Occurred once at Urpala in the society of *F. fuliginosa*. This species is exceedingly abundant here in early spring under stones and chips; sometimes an ant's nest is found under the same stone with the beetle, but I never discovered any connection between them, except the stone.

T. scitulus Er.—Taken not rarely in the nests of *F. rufa*. I only know this species at secondhand, having obtained it from Mr. Dury, of Cincinnati. Its habits in this country have not been noted.

Tachinus pallipes Grav.—Occurred once at Urpala among *F. fuliginosa*. *Pallipes* is very common here, and is simply a scavenger beetle.

Conosoma pubescens Payk.—Found occasionally in the nests of *F. rufa*. This species is abundant here under the bark about the base of dead trees and stumps; as ants also frequently make their nests in the same place, their being often found together is to be expected, but this does not make the species a myrmophile.

Ptenidium evanescens Marsh.—This species I include in my list doubtfully.

Meligethes æneus Fab. (*Brassicæ* Scop.).—Found rarely at Kavantholm in the nests of *F. rufa* by Mannerheim. In our country this species

occurs on the Pacific slope and in the Rocky Mountains, and I am unwilling to admit it in my list without further proof.

Cyphon padi Linn.—Taken rarely in the nests of *F. rufa* at Kavantholm, Kirjola and Urpala. It is not known as a myrmophile in this country.

Otiorthynchus maurus Gyll.—Maeklin occasionally took this species in the nests of *F. rufa* at Kirjola. In America this species is known to occur only in Greenland, and its habits are entirely unknown.

Leptura, Vol. XXI., 32.—While this article was in press, Dr. Geo. H. Horn published in the Tr. Am. Ent. Soc. a new arrangement of the *Leptura* therein named, based on an examination and study of the types in the British Museum. The form I mentioned as being undescribed turned out to be really *nana*, and now *hematites* is regarded as its varietal synonym. The typical *nana* is thus described:—"Antennæ always piceous; anterior femora and base of middle yellowish, many specimens, however, occur with brown legs, and others with parts of the hind legs yellowish." Except these two the other forms remain as before.

Erratum—Page 33, line 18, read female, instead of male.

ADDITIONS TO THE LIST OF CANADIAN COLEOPTERA.

BY ALVA H. KILMAN, RIDGEWAY, ONT.

By frequent trips to the woods and marshes in spring, to gather and sift the moss for hibernating coleoptera, by minutely examining the debris on the shore of Lake Erie, and by the use of umbrella and sweeping net later in the season, I have added to my collection of beetles, since 1886, several hundred good species. The following list contains those of my captures that do not appear in the lists of Canadian Coleoptera.

The species marked with an * are recorded by W. Hague Harrington in his additions to Canadian Coleoptera, published in Vol. XVI., page 44 of this journal. Those distinguished by two ** are named in Prof. J. T. Bell's list of Staphylinidæ, taken at Belleville, vide Vol. XVII., page 49 of this Journal. All the others, as far as I can learn, are quite new to Canada. For convenience of reference, I attach the numbers found in Henshaw's List of North American Coleoptera.

To Mr. Henry Ulke, of Washington, I am indebted for correct determinations. Dr. John Hamilton, of Allegheny, also kindly assisted me.

Upon such authority, it will be safe to credit the insect fauna of Canada as follows:

- 155—*Elaphrus fuliginosus* Say. Rare, with *Elaphrus Clairvillei* Kirby, hibernating under moss in low woods. March to May.
269—**Clivina Americana* Dej. On lake shore.
285—*Schizogenius ferrugineus* Putz. Very rare; one specimen in the sand on lake shore.
300—*Nomius pygmaeus* Dej. Muskoka. August.
372—*Bembidium arcuatum* Lec. Rare in moss.
580—*Pterostichus Pennsylvanicus* Lec. Found hibernating in the clay of moss-covered banks in low woods; not rare. April.
741—*Badister reflexus* Lec. Not common in moss.
784—*Platynus pusillus* Lec. Rare; found two specimens on a decayed log. May.
792—**Platynus propinquus* G. & H. Rare; hibernates in decayed wood.
1150—*Acupalpus carus* Lec.
1165—*Tachycellus Kirbyi* Horn. Common in moss.
1186—*Anisodactylus interpunctatus* Kirby.
1262—*Desmopachria convexa* Aubé. Not common.
1434—*Agabus subfuscatus* Sharp. Rare in clear water.
1818—*Scydmænus maria* Lec.
1920—*Bryaxis dentata* Say.
2096—***Heterothops fumigatus* Lec.
2102—*Quedius peregrinus* Grav.
2199—*Philonthus æqualis* Horn. Common.
2221—*Philonthus nigrutilus*. Quite common.
2236—*Actobius nanus* Horn.
2237—*Actobius inutilis* Horn.
2243—*Actobius sobrinus* Er.

These species of *Actobius* are found in moss on the ground in wet places of the low woods. April and May.

- 2337—*Stenus indigens* Casey.
2364—*Stenus pusio* Casey.
2377—*Stenus mammops* Casey.

- 2384—*Stenus egenus* Er.
 2391—*Stenus canaliculatus* Gyll
 2398—*Stenus parallelus* Casey.
 2463—*Stenus punctatus* Er.

The *Steni* are to be found in sphagnum and other mosses at any time of the year, but especially in early spring. The same may be said of nearly all the Staphylinidæ here named.

- 2527—***Lathrobium tenue* Lec.
 2530—***Lathrobium debile* Lec.
 2548—*Scopæus dentiger* Lec.
 2562—***Lithocharis obsoleta* Nordm.
 2675—***Mycetoporus flavicollis* Lec.
 2724—*Bledius nitidicollis* Lec.
 2757—*Oxytelus nitidulus* Grav.
 2948—*Trichopteryx sericans* Heer.
 2978—*Bæocera concolor* Fab.
 2983—*Scaphisoma suturale* Lec.
 3017—*Sacium lunatum* Lec. Found on dead twigs of apple. June.
 3234—*Tritoma festiva* Lac. Three specimens on decaying beech tree. June.
 3235—*Tritoma macra* Lec. Rare ; beaten from decaying tree trunk.
 3244—*Synchlita laticollis* Lec. One specimen from dead wood.
 3326—**Lamophlæus convexulus* Lec. Two on dead apple twigs.

(To be continued.)

CATCHING BUTTERFLIES BY MEANS OF DECOYS.

BY SHELLEY W. DENTON, WELLESLEY, MASS.

It has long been a matter of fact to me, and one which has served a good purpose, and doubtless to other readers of the CAN. ENT., that many butterflies, especially the larger kinds, are attracted by decoys resembling themselves in size and colour.

So many incidents of this nature have crowded themselves upon my notice, that I trust it will not be considered presuming on my part to enumerate a few of them, and at the same time state the benefits to the butterfly hunter which may arise from this source.

My attention was first called to this fact some fifteen years ago, while collecting in the neighborhood of Boston. I caught one day an example of *Papilio turnus*. After taking the insect from my net, and while holding it in my fingers, preparatory to placing in my collecting box, another butterfly of the same kind darted down at the one I held and fluttered above it for a moment, as if to entice it away. I was so surprised that no attempt was made to capture the visitor until he had risen beyond reach. Expanding and placing on a bush close by, the almost lifeless butterfly which I had held in my fingers, and partially concealing myself, I awaited the insect's return; nor was I disappointed or obliged to wait long. I could catch an occasional glimpse through the bushes of my intended victim: nearer it came, till hovering for a moment above my decoy, was easily secured. This plan was followed during the rest of that day, and more or less since that time, with gratifying results; having caught as many as thirty-seven *Papilio turnus* in a day, and that, too, in a place like Eastern Massachusetts, where they are, so far as my experience goes, not very common.

While in Nevada, in the summer of 1887, this method was followed with good success in the capture of *Papilio rutulus*, *eurymedon*, and *daunus*; *Argynnis leto*, *nepadensis*, and *coronis*; *Limenitis lorquini*, and others. I found a piece of bright yellow paper, cut out to resemble *P. rutulus*, proved almost as attractive as a butterfly of that species, and even a yellow leaf, which I picked up and placed in a conspicuous spot, answered the purpose very well once, to enable me to secure a decoy.

I find the best place to expose a decoy is in some sunny nook, where an occasional specimen of the species of which you are in search is seen, allowing the full rays of the sun (provided your decoy is a butterfly) to strike on the expanded wings. It is usually my custom to cut down the green bushes, except, perhaps, one in the centre of the opening, and stripping the leaves from the tallest sprig or branch, place my decoy on the point. The decoy may be a badly damaged specimen—one not fit to preserve.

This method applies best to the larger and stronger flying species of butterflies, and these are the ones the hunter has the greatest difficulty in procuring, especially if the country is rough and broken, so he is restricted in his movements by deep gullies, cliffs, or large, loose rocks. Occasionally the hunter will have an enemy in the shape of a large dragon

fly, which will pounce on the coming prize just as you are about to "scoop" it in; then away the two will go. The butterfly soaring and flapping often till almost out of sight, in the vain endeavour to rid itself of the enemy which has taken such a death-like grip upon it, but this shark of the air is in the end generally victorious.

In some countries, such as Australia and New Guinea—and I speak of these because of personal knowledge—there are large and showy butterflies of very powerful flight, which are almost impossible to catch on the wing, not only being shy, but high-fliers; and I know of no way in which they can be taken so readily as by the method above described. I refer particularly just now to that large and magnificent blue butterfly (*Papilio Joësa*) which in Northern Queensland may be seen alighting on or floating above the tops of the forest trees, occasionally flashing in the sunlight like a star of unusual brilliancy. It is a magnificent sight to a butterfly hunter, and one that will fill him with enthusiasm, but one likely to be of great disappointment should he wait for it to come within reach or settle near the ground, where it could be taken with his net; for nine times out of ten, when it takes flight, it will sail around and away over the tops of the trees till lost from view, unless you have something to catch its eye and cause it to descend from its elevated position. Now, procure one of the same species and place it in a conspicuous place in the sunlight; conceal yourself near by, but be ready to strike at a moment's notice, and await the result. Your decoy will most likely soon be seen (for it is wonderful how quickly a butterfly will discern one of its own kind), and down will come the longed-for prize, to your delight and satisfaction; but you must sweep with your net at just the right time, or the opportunity is lost. But perhaps you ask how is the first specimen or decoy to be obtained? This is often a matter of considerable difficulty. I was accustomed when rambling in the forests of that country to carry a gun, and although when obtained by shooting they were generally in a rather dilapidated condition, yet they served the purpose of a decoy very well.

One thing which has always surprised me, is the remarkable sight and, perhaps, sense of smell which some insects seem to possess. Often while having a decoy exposed, I have been startled by the sudden appearance of a butterfly when none were apparently in the neighborhood. The causes which lead to the attractiveness of decoys no doubt are various. Possibly the passing butterfly on seeing the decoy, supposes the latter

has found an abundance of suitable food. But my opinion is, that in the majority of cases it is a matter of sexual importance, and but for this powerful influence which causes them to seek each other, and thereby propagate their species, these most beautiful objects of nature would eventually die out.

NOTES ON THE PREPARATORY STAGES OF CARTEROPHAGUS CEPHALUS MANDAN.

BY JAMES FLETCHER, OTTAWA.

Amongst some fertile eggs of butterflies obtained during the past summer by gently pressing the abdomen of ripe females, was one of the above species, the larva of which was carried through four moults up to hibernation. The information gathered is incomplete; but as there is nothing published concerning the preparatory stages of *C. Mandan*, it seems worth recording, if only to assist others who may be fortunate enough to secure eggs of this rare butterfly. Although widely distributed over North America, I know of no locality where it is abundant. Females taken at Nepigon in the Lake Superior district laid eggs in confinement upon common lawn grass (*Poa pratensis*).

The following description is drawn from one specimen only for the last two stages, but from three for the first three stages:—

Egg.—Pale greenish white, hemispherical, broader than high, apparently smooth, but when magnified found to be very faintly and vertically grooved or wrinkled, and densely and uniformly pitted with deep pores which are wide at the mouth and taper to a fine point. Eggs laid 13th July, hatched 23rd.

Larva.—At birth. Length 2.5 mm. Breadth of head, .45 mm.; of body, .35 mm. Length of bristles, .05 mm. Yellowish white, with head and thoracic shield black. Head large and smooth. Body slender, equal. Thoracic shield narrow and bearing a few slender hairs. Body bearing on each side four series of trumpet-shaped bristles. Duration of first stage five days.

From the very first these larvæ were great wanderers, frequently leaving their food plant and crawling all over the glass lamp chimney which was used as a cage. In these wanderings they spun silken paths wherever they went, and to prevent their escape a plug of cotton wadding was

kept in the top of the chimney. This habit of wandering was kept up through all the stages, and the inside of the glass was covered with their silken paths. At no time, however, did they construct a tent by catching several leaves together in the manner of the larvae of *P. Mystic*, *P. Cernes* and *P. Manitoba*. Directly after they hatched, the young larvæ climbed up to the tops of the blades of grass and made a sort of tent by catching the opposite edges together with two or three cords of silk, about half-an-inch below the tip. They then attacked the edges of the leaf, eating down each side and leaving the midrib. When at rest, during the first three stages, they retired beneath their tents and lay extended along the midrib. After the third moult they would sometimes roll the leaf of a wide species of grass, as *Panicum crus-galli*, into a tube similar to those made by *P. Hobomok*. After the fourth moult no tent was made, the larvæ lying exposed on the upper surface of the leaves when at rest.

After First Moult.—Length, 3.5 mm. Head white and furrowed at apex. Thoracic shield black, much smaller than in first stage. Body pale green with two narrow white lines on each side—one sub-dorsal, the other supra-lateral. Spiracles yellowish. Whole body covered with a minute pubescence. Duration of this stage five days.

After Second Moult.—Length, 6.5 mm. Head rather higher than broad, slightly broadest at the base, rounded at apex, and bilobed by reason of a deep frontal groove; mandibles and two clouds on the cheeks, fuscous. Thoracic shield, transparent and hardly discernible. Body pale green and translucent, the dorsal vessel and the ramifications of the tracheæ showing plainly through the transparent skin. There are, on each side, a pale sub-dorsal band with irregular edges, a distinct clear white supra-lateral stripe, and a very faint supra-stigmatal line. The sub-dorsal bands unite on the anterior fold in the anal segment. The supra-lateral stripes at the end of the anal flap. Duration of stage seven days.

After Third Moult.—Length, half an inch. Head lighter in colour, without the fuscous marks on the cheeks. Of the same size as the cylindrical body. Colour more glaucous green than in previous stages. Duration fifteen days.

After Fourth Moult.—Length six-eighths of an inch. Head greenish, tinged with yellow, a little larger than second and last segments, but smaller than the rest of the body. Head squared at the base, rounded at the apex, and deeply grooved down the front. Width at the base and the

height about equal. Surface minutely roughened. Ocelli black, arranged in a semi-circle following the contour of the face, four in front and two on lower side. The third and fourth are twice the size of the others. Mandibles white with black tips. Thoracic shield not distinguishable. Body glaucous green with a pale sub-dorsal band, clearly defined with white above, much paler below, leaving a distinct green dorsal stripe. Supra-lateral stripe conspicuous, creamy white and clearly defined; not so wide as the pale sub-dorsal band. Below this, and half way to the spiracles, is a very pale thread-like supra-stigmatal line. Spiracles white, very inconspicuous on a thread-like line, or perhaps this may only be the tracheæ showing through the skin. On segments three and four (counting the head as No. 1) there appear to be beneath the transparent skin, instead of spiracles, knots of tracheæ. Whole body, including the head, minutely shagreened and covered with small piliferous papillæ, which, on segments two, three and four, are black at the base of the hairs. The segmental folds of the body of the mature larva are as follows:—Segment two, transversely grooved; segment 3, three equal folds; segment 4, four small folds; segments 5 to 11 consist of five folds, the anterior twice the width of the second, which, again, is twice the width of each of the other three; segment 12, three equal folds; segment 13, two small folds and the anal flap.

Some interesting epidermal organs, first observed upon this species, but since found on the larvæ of other Pamphilidæ, as well as on the pupa of *P. Cernes*, (the only pupa I have examined) are some small round chitinous disks, which appear to be trichomes or modified hairs. I form this conclusion from finding that, in one species, there occurred in two instances, instead of these disks, piliferous tubercles; they are rather small and difficult to examine. In the larva of *C. Mandan*, they appear to be saucer-shaped, having a raised edge. In the larva of a species of Pamphila, near to *Manitoba*, they are, in some instances, simple annuli; but, in *P. Cernes* and *P. Mystic*, seem to be rather cone-shaped.

Upon the larva of *C. Mandan*, they are arranged in three lateral series, two of which are complete and occur on all the segments except the head, and the other ventral and incomplete, occurring only on segments five, six and eleven.

The first series is placed above, and anterior to the spiracles, and the disks are sometimes double upon the abdominal segments; but they are not always uniform on the opposite sides of the body. In the specimen

most carefully examined, they were double on segments eight, nine, ten and twelve upon one side, but only on eight and nine on the other, and on segment five there was no disk of this series on one side, but it was present on the other. On segments two, three and four, they are on supra-stigmatal line. On segments five to twelve, below supra-stigmatal line. On segment thirteen on supra-lateral stripe, larger than the others.

The second series is single throughout, posterior to the spiracles, except on segments two, three and four, where they are slightly anterior on the fold above the thoracic feet. The third, ventral, series occurs only on segments five, six and eleven, just beneath the stigmatal fold.

The shape of the larva when mature was different from that of the first stages, the body being largest in the middle and tapering off to each end. The full-grown larva measured one inch and one-eighth on September 12 (twelve days after the last moult). After this, it fed sparingly for about two weeks, and then spun a mat of silk on the face of a blade of grass and drew two other blades over it with single strands of silk. The furrow down the face deepened and appeared to open a little, and I felt sure pupation was going to take place. This, however, was not the case, and two days later the larva left the grass and spun another mat on the sloping side of the lamp chimney. It now ceased to eat, and the colour changed gradually, all the green fading out, and in ten days the body was of a yellowish cream colour with white stripes. This again darkened until the ground colour was a very pale brown or dove colour. The moisture which condensed on the side of the glass kept the lower part of the larva's body constantly wet; but I did not like to risk removing it, as I looked for pupation at any day. After remaining still, and evidently, in hibernation for about five weeks, I found it had fallen from its mat to the ground on 29th October. After about a fortnight discoloured spots began to appear, and I found it was dead. It was at once put into alcohol for preservation and examination.

These larvæ fed freely on all grasses offered to them, but seemed to prefer wide-leaved species; this, however, may have been an instinctive preference for protection, both from the shape of their bodies and the coloration, added to a habit of lying extended down the midrib with the body closely appressed, the lower part of the head protruded, and the apex drawn back; these larvæ are well hidden from observation. The favourite grasses were *Panicum crusgalli*, *P. sanguinale* and *Triticum repens*.

POPULAR AND ECONOMIC ENTOMOLOGY—No. 3.

CUT-WORMS.

BY JAMES FLETCHER, OTTAWA.

Of all the injuries committed year after year upon field and garden crops, none are more annoying than those due to the ravages of the various caterpillars known as Cut-worms. These are the larvæ of dull-coloured, active moths, belonging for the most part to the three genera, *Agrotis*, *Hadena*, and *Mamestra*, and in North America alone constitute an army of no less than 340 different described species, many of which are, at times, very abundant. They may be described, in a general way, as smooth, almost naked, greasy-looking caterpillars, of some dull shade of colour similar to the ground in which they hide during the day. The head is smooth and shining, and sometimes of a different colour from the rest of the body. On the segment next to the head is a smooth plate, known as the thoracic shield, and there are three or four series of bristle-bearing tubercles along the sides. Their habits are nocturnal, that is, they feed at night and lie hid during the day-time. The habits of most cut-worms are as follows:—The eggs are laid in spring, summer, or autumn, and the insects pass the winter either in the perfect moth state, as a half-grown caterpillar, or as a chrysalis. Those which hibernate as moths, lay eggs in the spring and moths are produced in the autumn. The eggs which are laid in summer and autumn hatch soon after, and the caterpillars either become full fed the same season and pass the winter underground in the chrysalis state, or, after feeding for a short time, become torpid, and so pass the winter beneath stones, heaps of dead vegetation, or in cells beneath the surface of the ground. The injury done by the young caterpillars in the summer and autumn is seldom noticed at those seasons, on account of the abundant vegetation; but, in the spring, not only are the caterpillars larger and capable of more mischief, but the land is cleared of all vegetation other than the crop which is to be grown. They are then particularly troublesome in gardens, cutting off young cabbages, tomatoes, and other plants as soon as they are pricked out. When full fed, these caterpillars burrow into the ground to a depth of some inches and turn to brown chrysalids inside a smooth cell or a light

cocoon, Fig. 3. From these, after a few weeks, the perfect moths emerge. They are very active at night, and, when disturbed, have a habit of dropping to the ground and remaining perfectly still



FIG. 3—COCOON.

as if dead, where, from their dull colours, they are difficult to detect. When at rest, their wings lie horizontally over their backs, and the upper ones entirely cover the lower pair. The upper wings are generally crossed with one or more waved lines, and always bear two characteristic marks—one about half way down the wing, orbicular in shape; the other nearer the tip, reniform or kidney shaped. Fig. 4 shows "The Gothic Dart Moth" (*Agrotis subgothica*, Haw.), with wings closed and expanded; this is a very common and injurious species, the caterpillar of which is too well known as the "Dingy Cut-worm."



FIG. 4—GOTHIC DART MOTH.

Cut-worms may be divided into three classes, according to their habits, and remedies must be applied in a slightly different manner for each. These classes are:—

1. Climbing Cut-worms, or those which climb trees and destroy the buds.
2. Surface Cut-worms, or those which live on the surface of the ground and cut off herbaceous plants just beneath the surface of the soil.
3. Those which combine both of these habits.



FIG. 5—AMPUTATING BROCADE MOTH.

Of the first class, a good representative is the Climbing Cut-worm (*Agrotis scandens*, Riley). The Dingy Cut-worm, the caterpillar of the Gothic Dart Moth (Fig. 4), belongs to the second class, and the "Variegated Cut-worm" (*Agrotis saucia* Treit.), and the "Yellow-headed Cut-worm," which turns to the "Amputating Brocade Moth" (*Hadena arctica* Bois.) (Fig. 5) are good representations of the third class.

Remedies.—There are several remedies which may be used for cut-worms. For the climbing kinds, the best remedy is to place round the stem of the tree or bush to be protected, a strip of tin four inches wide, the lower edge can be pressed into the ground, and the tubular shape is easily preserved by securing it above with a piece of twine. This will effectually keep all cut-worms from the tree, for these heavy-bodied caterpillars are unable to crawl over the smooth surface. A similar expedient is to tie a band of cotton batting around the stem, as the caterpillars cannot crawl over this yielding material.

For surface cut-worms the most efficient remedies are the following:—

1. Keeping down all weeds in late summer and autumn, so as to deprive those species which hatch in the autumn of their food supply and winter shelter.

2. Burning off all the stubble and rubbish as late as possible in spring, when many caterpillars and the eggs of some species will be destroyed.

3. Placing some substance with an obnoxious odour around young plants when first set out, as fresh gas-lime, or sand or sawdust saturated with coal oil or carbolic acid.

4. Wrapping. Young plants may be protected in a large measure by simply wrapping a piece of paper around the stems at the time of planting.

5. Tomato cans with the tops and bottoms cut out, placed over the young plants, or strips of tin as suggested for Climbing Cut-worms, will be found to well repay the trouble and expense of procuring them.

6. Kerosene emulsions. Where these caterpillars occur in very large numbers, spraying infested beds with a kerosene emulsion at night has been found very beneficial.

7. Traps. Placing bundles of leaves or grass, poisoned with Paris green, between the rows of infested beds has been found a useful means of destroying large numbers of these pests.

8. Hand picking. When a plant is seen to have been eaten off, of course the cut-worm should always be looked for and destroyed. They will generally be found close to the root and about an inch beneath the surface.

In addition to the above artificial remedies, nature has provided the



FIG. 6—FIERY GROUND BEETLE.

farmer with many useful and active assistants in the shape of various predaceous insects. Conspicuous amongst these are the Ground Beetles, which should be known by sight by every one, so that they may be protected, and not, as is too often the case, destroyed *because they are insects*. At Fig. 6 is shown the "Fiery Ground Beetle" (*Calosoma calidum* Fab.), a common and very useful species. Its colour is deep black with red (or sometimes green) glowing spots. The grub has been styled the "Cut-worm Lion," on account of its useful habit of destroying these pests.

CORRESPONDENCE.

AN EARLY BUTTERFLY.

Dear Sir: While driving in a cutter on 12th March, my attention was attracted to a butterfly fluttering around a farmer's house. Seeing it alight, I attempted to capture it, but although I got near enough to make sure it belonged to the genus *Grapta*, it rapidly flew across a wide field of deep snow and easily eluded pursuit. The weather was mild, and as far as my experience goes, this species is the earliest butterfly to appear in our vicinity; but I consider this particular record as somewhat remarkable even for *Grapta*.

Plover Mills, Ont.

ROBERT ELLIOTT.

CAPTURES AT MONTREAL.

Dear Sir: During the past summer a few butterflies have been taken here which are perhaps worth noting. I took a *Pieris napi oleracea* on May 21, and half a dozen *Pyrameis huntera* and two *P. cardui* one afternoon in September. *Oleracea* is very local and has almost disappeared. *Huntera* is very rare, one or two specimens perhaps being observed each year, and *cardui* has been scarce since 1884, when the species appeared in great abundance. A specimen of *Feniseca Tarquinius* was taken in June and two in July of the previous year (1887). These are the only instances of its occurrence here.

E. C. TRENHOLME, Montreal.

Mailed June 5th.

